



## INITIAL ENVIRONMENTAL EXAMINATION

<b>Activity Name:</b>	Desert locust response to mitigate impacts on food security and livelihoods
<b>Geographic Location(s)</b>	Ethiopia, Kenya, Somalia
<b>Amendment (Yes/No)</b>	No
<b>Start/End Date</b>	Feb 2020 - Sept 2020 (nominal 6 months, up to one year <sup>1</sup> )
<b>Award Number(s):</b>	TBD
<b>Implementing Partner(s):</b>	FAO
<b>Bureau Tracking ID:</b>	DCHA_OFDA_Locust IEE _FAO ET KE SO_2020
<b>Tracking ID of Related RCE/IEE</b>	<b>Ethiopia</b> Feed the Future Value Chain Activity (FtFE VCA) PERSUAP, 2017 <sup>2</sup> ; <b>Kenya</b> Agricultural Value Chains Enterprises (KAVES) PERSUAP, 2019; <b>Somalia</b> PERSUAP: Partnership For Economic Growth Program (PEG), 2015

### ORGANIZATIONAL DATA:

<b>Implementing Operating Unit(s):</b>	DCHA/OFDA/ECA
<b>Other Affected Operating Unit(s):</b>	AFR, BFS
<b>Lead BEO Bureau:</b>	DCHA
<b>Funding Account &amp; Account:</b>	\$18,000,000, IDA
<b>Prepared by and Date:</b>	ECOS Project, 24 February 2020

<b>Analysis Type:</b>	IEE	including Pesticide Analysis, per 216.3(b)(1)
<b>Environmental Determination:</b>	Negative Determination	

<sup>1</sup> As in Section 5, if and when duration changes, then an IEE amendment will be completed.

<sup>2</sup> (<https://ecd.usaid.gov/repository/pdf/50734.pdf>); <https://ecd.usaid.gov/repository/pdf/52073.pdf>,  
<https://ecd.usaid.gov/repository/pdf/43821.pdf>

## THRESHOLD DETERMINATION AND SUMMARY OF FINDINGS

### ACTIVITY SUMMARY

In response to FAO's proposal to USAID for "*Desert locust response to mitigate impacts on food security and livelihoods*," USAID is funding FAO locust control activities in Kenya, Ethiopia, and Somalia.

These activities include ground and aerial surveying, procurement and use of pesticides (as in **Table 1**) and related equipment (such as user safety PPE and pesticide container disposal crushers), provision of Cholinesterase test kits, community awareness, and government pesticide safety training (as in **Table 2**).

### THRESHOLD DETERMINATIONS

**Negative Determination** is recommended for this activity, subject to the issues described in Sections 4 and 5, and **Annex A**: 12 Factor Pesticide Analysis per 22 CFR 216.3(b)(1).

Pursuant to 22 CFR 216.2 (e). The exemptions of International disaster assistance; §216.2(b)(i) are not applicable to assistance for the procurement or use of pesticides.

USAID is not invoking an Exception to Pesticide Procedures for "Projects under emergency conditions" per 22 CFR 216.3(b)(2)(i), because USAID proactively began planning in advance to permit sufficient timing for the pesticide procedures oversight to be conducted (as in **Annex A**).

Upon IEE approval, this recommended determination becomes a 22 CFR 216 Threshold Decision, and the conditions become mandatory obligations of implementation per ADS 204.

## USAID APPROVAL OF INITIAL ENVIRONMENTAL EXAMINATION

**PROJECT/ACTIVITY NAME: DESERT LOCUST RESPONSE TO MITIGATE IMPACTS ON FOOD SECURITY AND LIVELIHOODS (2020)**

<b>Approval:</b>	<b>Cleared via hand signature</b>	<b>2/28/2020</b>
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<b>Concurrence:</b>	<b>Cleared by Email</b>	<b>2/28/2020</b>
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	Erika Clesceri, DCHA Bureau Environmental Officer	Date

**DISTRIBUTION:** CC: OFDA Ag; MEOs for Ethiopia, Kenya, Somalia; E Africa/Kenya REA; AFR BEO; BFS BEO; FFP Ethiopia, Kenya and Somalia Teams

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## 1.0 PURPOSE, SCOPE AND ACTIVITY DESCRIPTION

### 1.1 PURPOSE AND SCOPE OF THE IEE

The purpose of this document is to provide a preliminary review of the reasonably foreseeable impacts on the environment of the USAID/OFDA-funded FAO actions in Ethiopia, Kenya and Somalia (described herein) to curb the spread of desert locust, all in accordance with Title 22, Code of Federal Regulations, Part 216 ([22 CFR 216](#)).

Note that this IEE is necessary as the use of pesticide for wide-area locust control is **not covered in existing** (i.e., country-level) USAID Pesticide Evaluation Report and Safer Use Action Plans (PERSUAPs) for Ethiopia, Kenya, and Somalia. Rather, this IEE addresses the 12 factors required by 22 CFR 216.3(b) for each candidate pesticide (see **Annex A**) to assess the appropriateness of use or support with USAID funds, and to determine the specific conditions attendant to their use.

As described herein, these actions involve assistance to the procurement and wide area use of the two pesticides noted in **Table 1** for locust control.

**Table 1: Pesticides proposed for use by FAO in locust control.**

AI & Class	Formulation	Trade Name	Manufacturer & origin	Remarks
Malathion (Organophosphate)	ULV (925 g/l)	Malathion 925 g/L ULV	Simonis BV (Netherlands)	1 l/ha aerial & ground application
<i>Metarhizium acridum</i> (Entomopathogenic fungus)	Technical Material (Dry Powder; 5x10 <sup>10</sup> spores/g)	Green Muscle;  Novacrid	Elephant Vert Group (EVG) (Morocco, other countries of EVG operation)	Dry powder mixed with oil for ground application with ULV sprayers.

### 1.2 Activity Description

**Background: East Africa Locust Outbreak.** The East Africa region is facing the worst desert locust outbreak in over 25 years. As of mid-February 2020, the infestation, which began in Yemen in early 2019, has spread to at least eight countries in East Africa. Despite ongoing control efforts, the desert locust outbreak presents a current, significant threat to food security and livelihoods in Ethiopia, Somalia and Kenya, with the potential for spread of significant impacts to other countries in the region.

Despite ongoing control efforts, the desert locust outbreak continues to threaten crops, pasture, and livestock, representing a significant threat to food security and livelihoods in Ethiopia, Somalia and Kenya. As of mid-February, desert locusts had affected at least 581,000 and 173,000 acres of land in Ethiopia and Kenya, respectively. In Somalia, 445,000 acres of land require urgent pest control

interventions. On January 31, FAO released a six-month \$76 million response plan that prioritizes locust control operations and food security and livelihood interventions in the region to stop further spread and curtail increasing humanitarian needs.

Due to the scale of the locust infestation and resulting damage to crops and pasture lands in Ethiopia, U.S. Ambassador Michael A. Raynor issued a disaster declaration for desert locust-affected areas of Ethiopia on November 18, 2019. In response, USAID/OFDA provided initial \$800,000 to FAO in Ethiopia to support the training of more than 300 pest experts and scouts in locust survey, monitoring and control as well as support training in environmental assessment and health/safety of the pesticides (incl. empty containers) and the provision of 5,000 sets of personal protective equipment (PPE) for locust control operations. Similarly U.S. Chargé d’Affaires Brian Neubert declared a disaster for desert-locust affected areas of Somalia on February 19, 2020 and Charge d’Affaires Eric Kneedler for affected areas of Kenya on February 25, 2020.

**Program Context: FAO Desert Locust Appeal.** In response to the East Africa desert locust crisis, FAO launched an initial, conservative appeal at the end of January 2020 outlining needs for control efforts, measures to safeguard agricultural livelihoods and coordination of the overall response in Ethiopia, Kenya and Somalia. The *FAO Desert Locust Crisis Appeal for Rapid Response and Anticipatory Action in the Greater Horn of Africa* urgently called for USD 70 million to mitigate locust impacts on food security. This was quickly followed by the release of an addendum calling for an additional USD 6 million for locust response in Djibouti and Eritrea. On February 26, FAO issued a revised appeal for \$138 million to cover control operations, livelihoods, and coordination in eight countries (Eritrea, Ethiopia, Djibouti, Kenya, Somalia, South Sudan, Tanzania, and Uganda).

As funding from resource partners is committed, FAO is prioritizing funds according to the most urgent needs, taking a programmatic approach to the allocation of funding by activity. The organization is advocating for flexible funding, which enables quick adjustments to activities to respond to emerging needs and to support the geographical and thematic areas of greatest priority. Likewise, the programmatic approach enables operations to adapt as the situation changes, streamlining activities to ensure the most appropriate assistance reaches affected populations sooner.

**USAID-funded Activity.** In response to the appeal and FAO’s specific proposal to USAID for “Desert locust response to mitigate impacts on food security and livelihoods,” USAID is funding FAO for actions defined by this proposal, all of which fall under Component 1 of the Appeal: “Curb the Spread of Desert Locust.” The actions supported with this funding are the subject of this IEE.

### 1.3 Actions to be Supported by USAID

Table 2. Locust control proposed to be supported by USAID in the three East African countries. The symbol (\*) indicates that USAID may support based on the FAO Project Proposal.

Proposed USAID-funded Locust Control Actions			
	Ethiopia	Kenya	Somalia
Support ground and aerial survey operations for early detection	*	*	*
Procure surveillance equipment (e.g., eLocust3); vehicles	<i>7 vehicles, hire 2 helicopters</i>	<i>GPS, radios camping equipment; portion of 5 pickups; hire 4 helicopters</i>	<i>5 sets of survey equipment</i>
Capacity building on surveillance methodology to government staff in the targeted areas	*	*	
Procure pesticides and Personal Protective Equipment (PPE); AcetylCholinesterase test kits	<i>70 000 litres of Malathion; 3,500 PPE, 25 AChE kits</i>	<i>2,000 AChE kits</i>	<i>~ 4,000 kg of bio-pesticides and 100 PPE kits.</i>
Procure pesticide application and disposal equipment (drum crushers and solvent for proper pesticide disposal)	<i>1 drum crusher</i>	<i>6 Drum crushers, 240,000 liters of solvents</i>	<i>10 vehicle sprayers, 4 pickups, back sprayer and chemical pumps; 2 crushers and 80 000 litres of solvent</i>
Train community focal points to report locust sightings to government	*	*	*
Support community sensitization on desert locust control activities. Raise awareness on the location, time and intended impact of control operations and how to protect the health of their families and livestock.	*	*	*
Train government staff in the safe and effective administration of pesticides for ground and aerial control operations.	*		*

Training on: safe pesticide handling, proper storage of pesticides (incl cold stores and rehabilitation of desert locust units and stores) and the disposal of pesticide drums.	*	*	*
Support countrywide assessments on (i) livelihoods impact of the infestation; (ii) efficacy of control; (iii) impact on environment; and (iv) on human health.	*	*	*

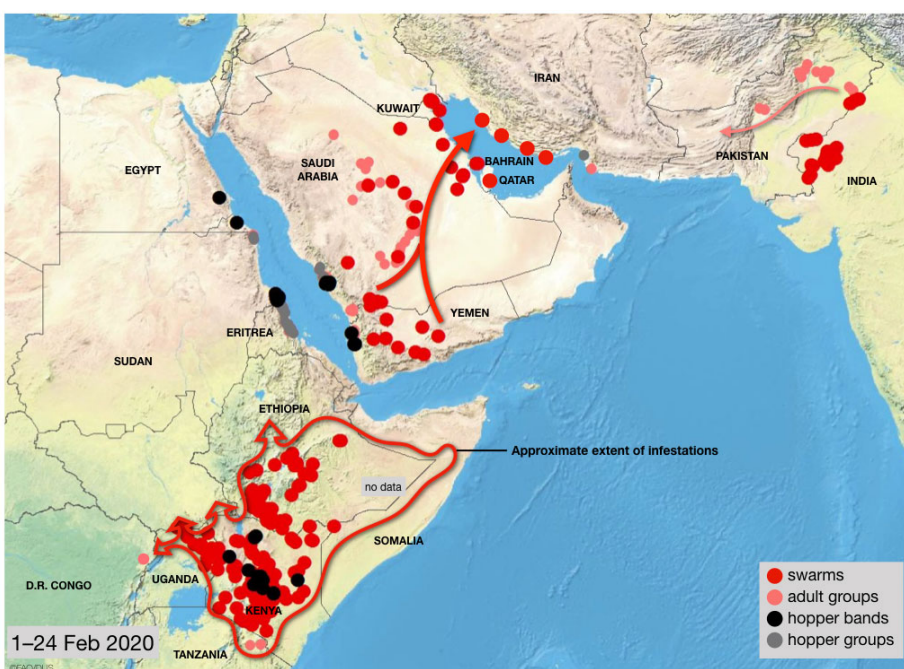
## 2.0 ENVIRONMENTAL AND LEGAL CONTEXT

The interventions described herein will take place in locust-impacted areas of Ethiopia, Somalia and Kenya which are evolving on a daily basis; with the **map** showing current impacted areas (February 2020, Source: FAO<sup>3</sup>).

Relevant environmental contexts and national pesticide regulatory regimes are described in the following USAID 22 CFR 216 Pesticide Evaluation Reports and Safer Use Action Plan (PERSUAPs) and other resources.

**None of the existing PERSUAPs address the application or pesticides for locusts over such a wide area.** In addition, host country-approved locust control pesticides are in flux as countries are moving to

expand control options: This IEE accordingly places responsibility on FAO to document host country authorization for use of the subject pesticides.



<sup>3</sup> <http://www.fao.org/ag/locusts/en/info/info/index.html>



- **ETHIOPIA:** The 2017 Ethiopia Feed the Future Ethiopia Value Chain Activity (FtFE VCA) PERSUAP (<https://ecd.usaid.gov/repository/pdf/50734.pdf>) cover all agricultural value chains previously addressed by separate PERSUAPs. The FtFE VCA PERSUAP presents a list of pesticides registered to control diseases, insect pests and weeds in maize, chickpea, and coffee. In addition, the list includes registered pesticides for disease and insect management of livestock in Ethiopia. The document also focuses on preventive IPM tools and techniques useful for each pest.
  - **ETHIOPIA:** For an overview of the Pesticide Regulatory Framework in Ethiopia, see “Policy-Practice Nexus: Pesticide Registration, Distribution and use in Ethiopia” [https://www.jsmcenral.org/sm-environment-toxicology/fulltext\\_smjet-v2-1006.pdf](https://www.jsmcenral.org/sm-environment-toxicology/fulltext_smjet-v2-1006.pdf).
  - **KENYA:** The Kenya Agricultural Value Chains Enterprises (KAVES) PERSUAP covers several programs, including: Kenya Crops and Dairy Market Systems; Integrated Agricultural Research for Development; Kenya Investment Mechanism; Nutrition and Health Program Plus; and Kenya Integrated Water, Sanitation, and Hygiene <https://ecd.usaid.gov/repository/pdf/52073.pdf>.
- Kenya** also has a Pest Control Products Act (<http://extwprlegs1.fao.org/docs/pdf/ken63608.pdf>) and a Registry of approved pest control products [http://pcpb.go.ke/listofregproducts/List%20of%20Registered%20Products%20%20Version%201\\_2018.pdf](http://pcpb.go.ke/listofregproducts/List%20of%20Registered%20Products%20%20Version%201_2018.pdf).
- **Somalia** developed a PERSUAP that establishes the set of pesticides for which support is authorized in USAID/Somalia Office’s partnership for Economic Growth (PEG) Project for South Central Somalia (<https://ecd.usaid.gov/repository/pdf/43821.pdf>).
  - **SOMALIA:** For a summary of the Pesticide Regulatory Framework in Somalia, see ‘Effect of Pesticides on the Agrosystem in Somalia’ ([https://www.researchgate.net/publication/333782827\\_EFFECT\\_OF\\_PESTICIDES\\_ON\\_THE\\_AGRO\\_ECOSYSTEM\\_IN\\_SOMALIA](https://www.researchgate.net/publication/333782827_EFFECT_OF_PESTICIDES_ON_THE_AGRO_ECOSYSTEM_IN_SOMALIA)). In general, however, the regulatory framework for pesticides in Somalia is weak.

### 3.0 ANALYSIS OF POTENTIAL ADVERSE ENVIRONMENTAL AND HEALTH IMPACTS

#### Potential Adverse Impacts

USAID-funded FAO actions to curb the spread of the desert locust should provide significant benefits in food security and livelihoods to the communities in the region.

**Adverse impacts of pesticide use.** At the same time, the broad-area use of pesticides, a key element of this response, in general, presents risks of significant adverse impacts to the health of the applicator, response worker and the community, and to the environment, arising from improper handling, application, and disposal, as well as targeting decisions.

Annex A presents the 12 factor analysis, required by 22 CFR 216.3(b)(1), as USAID funds are proposed to support the procurement and/or use of pesticides. This analysis provides toxicological profiles of the active ingredients of the two requested pesticides. The attached Safety Data Sheets (SDS) provide further, product-specific information. In summary, human and eco-toxicity is as follows:

#### ***Human health:***

- Malathion: Organophosphates such as malathion are relatively toxic to vertebrate organisms, like humans, and can interfere with the nerve function of an organism at lower doses. Symptoms of acute poisoning develop during or after exposure, within minutes to hours, depending on method of contact. Inhalation exposure results in the fastest appearance of symptoms, followed by the gastrointestinal route, and then the dermal (skin) route. Some of the early symptoms include headache, nausea, dizziness, sweating, and salivation. Symptoms such as muscle twitching, weakening, vomiting, abdominal cramps, and diarrhea all indicate a worsening condition.
- Metarhizium: This mycoinsecticide can cause moderate eye irritation and allergic skin sensitization with high or repeated exposure.

#### **Ecological Toxicity:**

- Malathion is a broad-spectrum insecticide. In addition, it is highly toxic to fish and aquatic organisms and to bees and moderately toxic to birds. These insecticides may be used as a last resort when rapid control is needed to protect agricultural crops in the immediate environment of a locust population.
- Metarhizium: According to the FAO Pesticide Referee Group (PRG) report, the mycoinsecticide *Metarhizium* has been shown to have very low risk to non-target organisms, including birds and reptiles which ingest the treated locusts. However, its mode of action on locust is relatively slow.

Risks become adverse impacts via poor procurement, handling, including transporting, storing and managing, application, disposal and targeting practices of pesticides, for example:

- Failure to wear prescribed PPE, to use proper mixing technique and application rates.
- Failure to use well-maintained, fit-to-purpose, properly calibrated equipment.
- Failure to procure quality pesticide products.
- Discarding pesticides, washing spray equipment, or rinsing empty pesticide containers in or near streams and rivers.
- Poor application targeting or wind can cause pesticide spray to drift away from its intended target. Insecticide drift can be deadly to non-target organisms, including beneficial insects, spiders and mites. Pesticide drift can also expose people to risks associated with such chemicals.
- Accidental spills to soil, which are usually associated with pesticide mixing and loading operations, can result in localized but severe soil contamination if not contained and cleaned up with rapidly and adequately.

For more information, consult the 2019 USAID *Crop Protection Sector Environmental Guideline*, available at: <https://www.usaid.gov/environmental-procedures/sectoral-environmental-social-best-practices/seg-crop-production/pdf>

**Adverse impacts of other USAID-funded actions.** Other USAID-funded actions under this activity have no foreseeable adverse impacts (e.g. surveillance), or are safer use actions intended to mitigate pesticide risks (e.g. the purchase of PPE).

## 4.0 ENVIRONMENTAL DETERMINATIONS

Upon IEE approval, the recommended Environmental Determination becomes a 22 CFR 216 Threshold Decision, and the conditions become mandatory obligations of implementation. While the risks of the activities described in **Section 1** must *in general* be considered significant in the context of broad-area pesticide use for locust control, in this specific activity context they will be, with high assurance, mitigated below the significant level, that would otherwise necessitate a higher risk rating of a “Positive Determination”, per 22 CFR 216.3(a)(2)(iii).

Given the limited scale of spraying directly supported with USAID funding, **FAO’s core competence** in pesticide safer use, the portion of USAID funding devoted to **safer** use, and the results of USAID due **diligence**, a **Negative Determination with Conditions** is appropriate. It is also notable that USAID will not pursue an “Exception” to the pesticide procedures.

**Core Competence:** Pesticide safer use is a core competency and expertise of FAO. In its standard operating procedures (SOPs) and guidance documents (see **Annex A**: 12 factor PERSUAP analysis), FAO has incorporated the principles of safer use consistent with USAID’s interpretation of this concept in USAID’s *Crop Production Sector Environmental Guideline*, and committed to implementing these SOPs and Safety and Environmental Precautions as part of activity design.

As a public international organization (PIO) with this core competence, it is further appropriate for USAID to defer to FAO for the implementation of the principles of safe use across the pesticide use cycle. In other words, USAID owes significant deference to FAO within this competency, per ADS 308.3.10, and conditions attached to the determination must only add requirements beyond FAO's own SOPs and guidelines where there is a compelling reason to do so.

**Safer Use:** A significant portion of USAID funding is being utilized for community outreach and sensitization, training of pesticide applicator staff, and the procurement and deployment of personal protective equipment (PPE), all critical elements of pesticide safer use. This also means that USAID funding provided for the procurement and application of pesticides is limited.

**USAID Due Diligence:** USAID has been evaluating the proposed locust control pesticide use, via:

1. Input of three cognizant [Bureau Environmental Officers \(BEOs\)](#), DCHA, Africa and Bureau for Food Security (TDY Ethiopia and Kenya February 2-14, 2020), per authorities in 22 CFR 216.3(a)(2), OFDA/PSPM staff, and the ongoing institutional capacity support of the USAID contract [Environmental Compliance Support \(ECOS\)](#); ongoing BEO oversight with FAO
2. USAID/OFDA obligation of dedicated funding into the ECOS contract (Order Number 7200AA18N00001) to conduct an eight (8) country regional East Africa Pesticide Evaluation Report Safer Use Action Plan (PERSUAP), over the months of March-April 2020. This regional pesticide assessment will help in better planning and coordination as the locust invasion changes over time, and may consider other geographic scopes.

Future research through USAID Bureau of Food Security (BFS) plans to focus on potential solutions to sustainably resolve transboundary invasive pest problems through a variety of local regional East African research and community mobilization entities, CGIAR Centers (?), and academic research institutions.

**Exemption vs Exclusion vs Exception:** USAID's environmental regulation planned for certain provisions where the procedures would not apply. For example, permissions for situations of International disaster assistance, through an **Exemption** under the procedures, per 22 CFR 216.2(b)(1)(i). Another, is where PIOs have limits to USAID oversight in ADS 308 and a Categorical **Exclusion** under §216.2(c)(2)(vi).

However, the **Exemption** of §216.2(b)(i) and Categorical **Exclusions** of §216.2(c)(2) are not applicable to assistance for the procurement or use of pesticides, per 22 CFR 216.2(e). Nonetheless, the regulation notes that there may be exceedingly special circumstances that would envision the need, for an **Exception** to Pesticide Procedures for "Projects under emergency conditions" per 22 CFR 216.3(b)(2)(i).

Where, "These Emergency conditions" (necessitating an **Exception**) "shall be deemed to exist when it is determined by the Administrator, A.I.D.. in writing that: (a) A pest outbreak has occurred or is imminent; and (b) Significant health problems (either human or animal) or significant economic problems will occur without the prompt use of the proposed pesticide; and (c) Insufficient time is available before the pesticide must be used to evaluate the proposed use in accordance with the provisions of this regulation."

**Not Invoking Exception:** While the current locust infestation meets many of the criteria noted, this USAID/OFDA funded project is not invoking the Exception. USAID began planning in a proactive manner which permitted sufficient timing for the pesticide procedures oversight to be conducted. Thus, the criterion of “insufficient time” does not apply.

## 5.0 CONDITIONS AND MITIGATION MEASURES

The following Conditions apply, and must be assured by the AOR:

1. FAO must implement, with close oversight and fidelity, its own **internal procedures**:
  - a. SOP for desert locust ground control,  
<http://www.fao.org/ag/locusts/oldsite/PDFs/SOPControlE.pdf>;
  - b. SOP for desert locust aerial survey and control,  
<http://www.fao.org/ag/locusts/oldsite/PDFs/SOPAerialE.pdf>; and
  - c. Desert Locust Control Guideline for Safety and Environmental Precautions  
<http://www.fao.org/ag/locusts/oldsite/PDFs/DLG6e.pdf>
2. Procurement, use of, or support for these pesticides **is limited to locust control activities in Ethiopia, Somalia, and Kenya only**. USAID funds may NOT support spraying of population centers. Pesticide applications should be focused on juvenile hopper groups and bands, and resting adults.
3. FAO may be asked to provide to USAID documentation that use of the subject pesticides is authorized by cognizant **host country authorities**. This IEE accordingly places responsibility on FAO to document host country authorization for use of the subject pesticides.
4. In keeping with FAO internal SOPs, and following from the 22 CFR 216.3(b)(1) 12-factor pesticide analysis presented in Annex A, USAID funding may only be used to **procure and support the use** of the pesticides in **Section 1, Table 1**.
5. FAO is recommended to, if practicable, utilize a **lower-risk oil than diesel as a suspension** for *Metarhizium*.

## GENERAL REQUIREMENTS

In addition, to the above specific

**Records Management:** The A/COR will maintain documents in the official activity file and work with the BEO to upload records to the public accessible USAID environmental compliance database system, <https://www.usaid.gov/environmental-procedures/compliance-database>.

**Distribution to Implementing Partner:** The A/COR must share the IEE with the partner implementing the activities in the field.

**IEE Amendment:** If new activities are introduced or other changes to the scope of this IEE occur, an IEE Amendment will be required for clearance by the cognizant BEO.

**Corrective Action:** When noncompliance or unforeseen impacts are identified, IPs notify the A/COR, take corrective action, and report on the effectiveness of corrective actions. The A/COR initiates the corrective action process and ensures the IP completes and documents their activities.

## ANNEX A: 12 Factor Pesticide Analysis per USAID Pesticide Procedures, 22 CFR 216.3(b)(1)

This section analyzes the 12 factors required by the USAID Pesticide Procedures, per 22 CFR 216.3(b)(1), for each requested pesticide. The purpose of this analysis is to assess the appropriateness of use or support with USAID funds, and to determine the specific conditions attendant to their use.

### Requested Pesticides

FAO is requesting authorization to procure, use, and support the use of the following pesticides for broad area locust control with USAID funding, as in **Table 1, Section 1**:

AI & Class	Formulation	Trade Name	Manufacturer & origin	Remarks
Malathion (Organophosphate)	ULV (925 g/l)	Malathion 925 g/L ULV	Simonis BV (Netherlands)	1 l/ha aerial & ground application
<i>Metarhizium acridum</i> (Entomopathogenic fungus)	Technical Material (Dry Powder; 5x10 <sup>10</sup> spores/g)	Green Muscle; Novacrid	Elephant Vert Group (EVG) (Morocco, other countries of EVG operation)	Dry powder mixed with oil for ground application with ULV sprayers.

### Factor A: US EPA Registration Status of the Proposed Pesticides

Both AIs in these formulations are available in US products registered by US EPA for the same as or similar uses.

*FAO will be required to provide USAID with documentary evidence of host country approval for use of these pesticides by cognizant host country authorities*

### Factor B: Basis for Selection of Pesticides

AIs recommended for approval in this IEE are recommended on the following basis:

1. Products containing this AI are registered by USEPA for the same or similar use and modes of application. The USEPA registration serves as a proxy for efficacy.
2. In the US, products containing the subject AI in selected formulations are not restricted use pesticides (RUPs). However, the use of Malathion in the US for wide area vector control is subject to applicator limitations, per the following typical label language: *“For use only by Federal, State, Tribal, or local government officials responsible for public health or vector*

*control, or by persons certified in the appropriate category or otherwise authorized by the State or Tribal lead pesticide regulatory agency to perform adult mosquito control applications, or by persons under their direct supervision.” The use of trained applicators under supervision as described under Factor K is consistent with this restriction.<sup>4</sup>*

3. FAO has identified these pesticides for locust control in East Africa based on efficacy, persistence, speed of action, safety, availability, shelf life and cost.

### **Factor C: Extent to Which the Proposed Pesticide Use is Part of an IPM Program**

FAO’s response strategy of which this activity is a part is survey-based and focused on achieving as much control as possible with highly targeted control methods before swarms become airborne<sup>5</sup>.

Specifically, the FAO strategy will target hopper populations during locust control operations as they occupy smaller areas, move slower and are more vulnerable to pesticides than adult (winged locusts) populations. The proposed treatment with the biopesticide, *Metarhizium acridum*, will target these hopper infestations, to protect large areas contaminated by hopper bands, thus preventing the formation of new swarms.

The conventional fast-acting pesticide, Malathion, is proposed for full cover treatments against adult locusts when rapid mortality is necessary, particularly if they are located near crops, or to prevent them from moving to other areas.

According to this strategy, the FAO intervention team will use ground based methods of application as much as possible to control the locusts before they swarm. Once the locusts have swarmed, aerial based methods will be used, but only if necessary.

### **Factor D: Proposed Method or Methods of Application, Including the Availability of Application and Safety Equipment**

The mode of application for locust control depends on the scale, location, stage in life-cycle, and the phase of infestation. The modes of application will include aerial swarm and aerial band Ultra Low Volume (ULV) spraying and ground applications. ULV application will use equipment that is designed and constructed for the specific purpose of metering and atomizing the ultra-low flow rates of liquid insecticides. Some ULV pesticides may require dilution with compatible solvents.

**Ground application** will be performed with vehicle-mounted ULV sprayers (Micron AU8115 or similar) and knapsack sprayers (AU8000 or similar). The vehicle-mounted sprayer is driven by a powerful airstream generated from an engine-driven blower mounted at the base of the unit. During operation,

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<sup>4</sup> E.g. see label for Drexel Malathion ULV 96.5%: [https://www3.epa.gov/pesticides/chem\\_search/ppls/019713-00540-20140409.pdf](https://www3.epa.gov/pesticides/chem_search/ppls/019713-00540-20140409.pdf)

<sup>5</sup> It is critical to control locusts early in their lifecycle – while they are grounded. The best time to spray locusts is during the nymph stage before they can fly. During this five- to seven-week window the locusts march in bands of up to two thousand insects per square meter. Once they are airborne, control methods become harder and more expensive.

Creating barriers has been found effective in slowing down fast marching bands. This process involves spraying pesticides on narrow strips of vegetation as a barrier against hopper bands. Pesticides are commonly the only method of control once locust becomes an airborne.



the airstream carries the spray droplets away from the vehicle and the operators. This can give an effective release height of up to 15 metres and enables a swath of over 100 metres to be covered when using a drift spraying technique with a wind speed of 2.5 metres/second or more.

The knapsack Micron AU8000 sprayer incorporates a 17 litre chemical tank and a 2-stroke engine driving a highly efficient air blower. A flexible air duct connects the blower to an AU8000 sprayhead. This contains a rotary atomizer, which is driven by adjustable fan blades in the airstream from the blower. The atomizer is fitted with a cylindrical metal gauze, which produces spray droplets of a precisely controlled size by rotary atomization. The airstream carries the droplets safely away from the sprayer and ensures complete penetration and coverage of the target. Chemical flows from the knapsack tank to the atomizer via an interchangeable restrictor tube for reliable and accurate control of application rate. The moulded handle of the sprayhead incorporates an easily operated on/off valve for control of output.

**Aerial application** will be performed by aircraft equipped with ULV atomizers (Micron AU5000 or similar). The ULV atomizers can be fitted directly onto the standard spray booms of most agricultural aircraft without any structural modification. Alternatively, quick-change replacement boom kits are available for popular types of aircraft and special installation kits can be supplied for some non-agricultural types.

The sprayers used for ground and aerial application, as well as the appropriate PPE for operators, and maintenance, pesticide handling crews, are being procured for the locust control effort, in part with USAID funding.

### **Factor E: Any Acute and Long-Term Toxicological Hazards, either Human or Environmental, Associated with the Proposed Use, and Measures Available to Minimize Such Hazards**

The table below provides the toxicological profiles of the active ingredients (AIs) for each of the 2 requested pesticides, including information on ecological toxicity to most sensitive air, aquatic, and terrestrial test organisms based on standardized protocols. See footnote<sup>6</sup> for abbreviations key.

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<sup>6</sup> Abbreviations Key: WHO Acute Toxicity: Class O = Obsolete Pesticide; Class Ia = Extremely Hazardous, Class Ib = Highly Hazardous; Class II = Moderately Hazardous; Class III = Slightly Hazardous, Class U = Unlikely to Present Acute Hazard in Normal Use. USEPA Acute Toxicity: Category I = Extremely Toxic, II = Highly Toxic, III = Moderately Toxic, IV = Slightly Toxic

Chronic Toxicity: KC = Known/Likely Carcinogen; PC = Possible Carcinogen; ED = Potential Endocrine Disruptor; RD = Potential Reproductive or Developmental Toxin; NT = [Cholinesterase](#) inhibitors that are Potential Parkinson's Disease Risk Factor and other neurological toxins

Acute Ecotoxicity: HT = Highly Toxic; MT = Moderately Toxic; ST – Slightly Toxic; NT = Not Toxic

USEPA REGISTRATION STATUS AND TOXICOLOGICAL PROFILE OF ANALYZED PESTICIDES													
Active Ingredient	Chemical class	US EPA RUP	Human Health Toxicity			Water contaminant	Persistent	Ecotoxicity					
			Acute toxicity Class		Chronic Toxicity			Mammals	Fish	Aquatic organisms	Bees	Birds	Earth worms
			WHO AI toxicity	EPA Products toxicity									
Metarhizium Anisopliae	Biopesticide Micro-organism derived	no	Not Listed	IV	none	Not known	no	ST	MT	ST	ST	ST	ST
Malathion	Organophosphate	Public health use	III	III	Neuro toxic	Likely	no	MT to HT	MT	HT	HT	MT	MT

Note: Beyond inherent AI toxicity and physical and chemical characteristics, product dose rate and formulation influence product toxicological hazards and its transport and fate in the environment. Toxicological effects may vary based on the route of exposure, either inhalation, ingestion or skin contact.

The attached SDS present the specific human health and ecological hazards associated with these products. As they show:

- Consistent with the FAO Pesticide Referee Group report, the mycoinsecticide *Metarhizium* has very low risk to non-target organisms, including birds and reptiles which ingest the treated locusts. However, its mode of action on locust is relatively slow.
- As an organophosphate pesticide, malathion is relatively toxic to vertebrate organisms and can interfere with the nerve function of an organism at lower doses. Symptoms of acute poisoning develop during or after exposure, within minutes to hours, depending on method of contact. Inhalation exposure results in the fastest appearance of symptoms, followed by the gastrointestinal route, and then the dermal (skin) route. Some of the early symptoms include headache, nausea, dizziness, sweating, and salivation. Symptoms such as muscle twitching, weakening, vomiting, abdominal cramps, and diarrhea all indicate a worsening condition. Malathion is highly toxic to fish, other aquatic organisms, and to bees and is moderately toxic to birds.

For *Metarhizium*, there is, however, a further issue: for application, Metarhizium (packed as dry spores in sealed packets) must be suspended in oil, and FAO's Metarhizium SOP specifies the use of diesel fuel oil for this purpose. In the US, use of diesel as a solvent/carrier is permitted only for non-food applications, and its use presents a set of concerns:

Exposure to diesel exhaust in small amounts can cause:

- Irritation to the eyes and nose
- Headache
- Nausea

Skin contact with diesel fuel may damage the kidneys.

Breathing diesel fuel vapors or exhaust for a long time can cause:

- Respiratory disease
- Kidney damage
- Increased blood pressure
- Lowering of the blood's ability to clot
- Cancer

Diesel oil can harm nontarget organisms and their habitats

Diesel is highly flammable

To minimize human health and environmental hazards FAO will adhere to the product label for the use, handling and disposal of pesticide and) otherwise implement its:

- Standard operating procedures for Desert Locust Ground Control (<http://www.fao.org/ag/locusts/oldsite/PDFs/SOPControlE.pdf>),
- Standard operating procedures for Desert Locust Aerial Survey and Control (<http://www.fao.org/ag/locusts/oldsite/PDFs/SOPAerialE.pdf>); and
- Volume 6 of its Desert Locust Guidelines, "Safety and Environmental Precautions" <http://www.fao.org/ag/locusts/oldsite/PDFs/DLG6e.pdf>.

The last guidance document addresses:

- (1) the reduction of environmental and human health risks from insecticide use during locust control. Practical recommendations are given on how to address risk reduction during the campaign preparation phase, how to implement it during the control operations, and how to evaluate it in post-campaign follow-up.
- (2) environmental and human health monitoring during locust control operations. Monitoring of control operations is necessary to assess whether adverse effects occur and under what circumstances. Such information is essential for improving control techniques and approaches.

All of this said, the use of diesel can only be justified if no other practicable options exist, and appropriate safeguards are taken against occupational exposures. These safeguards are more extensive than those required for safe handling of the *Metarhizium* material alone.

### **Factor F: Effectiveness of the Requested Pesticides for the Proposed Use**

Both pesticides have been shown to be highly effective when used consistent with their mode of action.

- Malathion has a fast-knockdown mode of action suitable for cover treatments (used mainly against adults locusts when rapid mortality is necessary, particularly if they are located near crops, or to prevent them from moving to other areas.
- *Metarhizium*, which requires several days for mortality, is most suitable for use on hoppers and young adults. Its use on hoppers has been observed to significantly increase bird predation, possibly by reducing the hopping defense behavior significantly in advance of mortality.

### **Factor G. Compatibility of the Proposed Pesticides with Target and Non-target Ecosystems**

The table presented under Factor E, above, provides the eco-toxicity profiles of the two AIs, indicating potential impacts of each AI on non-target organisms. Metarhizium is highly specific to the desert locust. Malathion is a broad-spectrum insecticide also highly toxic to mammals and aquatic organisms.

FAO's SOPs and Safety and Environmental Precautions, cited under Factor E, above, are intended to mitigate risks to non-target organisms, including use per label; labels must be the primary sources of information for ensuring use compatible with target ecosystems..

### **Factor H: The Conditions under which the Pesticide is to be Used, Including Climate, Flora, Fauna, Geography, Hydrology, and Soils**

Locust control may be carried out across a wide diversity of biophysical conditions across Ethiopia, Kenya and Somalia; see Section 2.0 of the IEE.

The diversity of biophysical conditions under which locust control may be carried out means that environmental factors must be considered for site specific pesticide use. For each application topography, weather, soil type, hydrology, flora and fauna are all highly relevant to the choice of the appropriate pesticide and its safer use. The FAO guidance, including Volume 2, Survey, of the Desert Locust Guidelines, and the Desert Locust Aerial Survey and Control SOP require appropriate site reconnaissance of the application areas to ensure that the site specific characteristics are understood prior to pesticide application.

The IEE requires the proper use of each pesticide per the product label and SDS to best assure that choice and use of each pesticide product is appropriate to the site specific biophysical environment.

### **Factor I: The Availability and Effectiveness of other Pesticides or Non-Chemical Control Methods**

While there are cultural and physical methods for locust control used during small outbreaks, these are mostly ineffective when locusts are in the gregarious phase during an upsurge. Only pesticides used for controlling both nymphs and adults are effective for the management of an upsurge. An upsurge is usually 2-3 successive transient breeding seasons or a widespread (intraregional) heavy infestation (that is defined as a plague).

### **Factor J: The Requesting Country's Ability to Regulate or Control the Distribution, Storage, Use and Disposal of the Requested Pesticide**

Ethiopia, Kenya and Somalia have legal arrangements for pesticide registration. However, each country, to varying degrees, has limited, inadequate capacity to develop and set pesticide regulatory frameworks, and to implement and enforce pesticides regulations. The regulatory ministries and agencies from each country are not able to properly oversee, control and enforce most aspects of import, distribution and use of pesticides, nor are they able to monitor and mitigate the effects of pesticide use on human health and the environment.

### **Factor K: The Provisions Made for Training of Users and Applicators**

Training is one of the chief mechanisms for ensuring safer and effective pesticide use by USAID funded activities and training of all relevant implementing staff is required. Providing training in recognizing symptoms of pesticide poisoning, first aid instructions and instructions on emergency procedures to all those employed in pesticide handling, all other individuals in or near treated areas, and the general public.

The FAO desert locust team has developed focused guidance, provided in Volume 6<sup>7</sup> of the the FAO Desert Locust guidelines, “Safety and Environmental Precautions,” and in the detailed FAO Standard Operating Procedures (SOP) for Desert Locust Control, that will be used to implement training for applicators and handlers/users.

### **Factor L: Provisions Made for Monitoring the Use and Effectiveness of the Pesticide**

“Recording and Reporting” are core elements of both FAO’s Desert Locust Ground Control SOP and FAO’s Desert Locust Aerial Survey and Control SOP. environmental and human health monitoring during locust control operations is one of 2 major topics addressed by FAO’s Desert Locust Control Guidelines vol 6: *Safety and Environmental Precautions*. See Factor E, above.

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<sup>7</sup> [http://www.fao.org/ag/locusts/common/ecg/347\\_en\\_DLG6e.pdf](http://www.fao.org/ag/locusts/common/ecg/347_en_DLG6e.pdf)

## **ANNEX B: MALATHION AND GREEN MUSCLE SAFETY DATASHEETS (SDS) ATTACHED**